The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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War and Chemical Development

DR. STINE of the Du Pont Company recalled last year the immense development in organic research in the U.S.A. during the past 25 years, a research effort that owed its inception to the realisation during the last war of the world's dependence on Germany for so many substances of industrial importance, especially in organic chemistry. The result of that research, in Dr. Stine's words, "not only contributed to eventual independence in respect to certain natural fibres and rubber, but also placed at our disposal methods for the manufacture of almost unlimited quantities of liquid and gaseous hydrocarbons from the vast natural resources of coal with which Nature has endowed the U.S.A." The expenditure on this research was colossal and huge sums running into millions of pounds were spent without any immediate profit. The result, however, was to be seen in an immense increase in the production of many classes of chemical products with a corresponding decrease in their price. This was particularly marked in coal-tar products, but although organic chemicals of non-coal-tar origin were slower in responding to research, the production of non-coal-tar organic chemicals (to instance one example) during the 17-year period 1921-37 showed an average annual increase of 685 per cent.

The facts quoted in the last paragraph on the authority of Dr. Stine illustrate what can be done by intensive research and to an even more marked extent they illustrate the futility of war. Had Germany in 1914 been content to strive for industrial domination instead of attempting political domination this vast development of the American chemical industry would not have occurred, or would at least have occurred to a much smaller extent, and Germany would still have been supplying the world with staggering quantities of manufactured products that are now made by other countries for themselves.

Mr. Maurice Holland, the director of the division of engineering and research of the National Research Council of the U.S.A., has recently been urging a still greater speed-up in research in that country in order to make it more effective to compete with Germany's "great and efficient" research system. He recalls that since 1920 the number of laboratories in the U.S.A. has risen from 300 to 2263, and the number of workers in those laboratories from 9000 to 70,063. Mr. Holland has indicated that research in the U.S.A. is branching into different lines from those which had hitherto been pursued, this being obviously the effect of war conditions. Research in that country is now entering the substitute or *ersatz* phase on which Germany has been working for 20 years. In his opinion the war has shown that Germany's substitute materials are generally good and that the organisation of the German research is the most highly integrated in the world. The U.S. Defence Programme has exercised far-reaching influences on industrial research. With some exceptions long-range fundamental or pure science research has been placed in abeyance and attention has been turned to the immediate problem of developing substitute materials to be used in armament. It is a surprising thought that a country so widely equipped with natural products as the U.S.A., and having through the command of the seas the possibility of importing natural products from most of the world, is yet turning its attention to substitute materials. The effect of this present war may very well be the general substitution throughout the world of synthetic manufactured materials for materials derived from natural products.

In other directions war is having a decided effect upon industry. In our issue for September 6, reference was made to the considerable development of light metals and alloys which is taking place not only as a result of the development of aeroplanes, but also in the construction of engines for all forms of transport. Reference was also made in that issue to the great power developments in Canada which owe their early construction to war needs. The world's requirements for power have been sharply stepped up and since it is water power that is being so largely developed the effect on electro-chemical processes will be considerable. This in itself will further the greater production of metals by electrical processes, and will also assist electro-chemical synthesis in other directions. Whatever may be the general outcome of the two Great Wars that have ravaged the world during the first half of this century it is certain that they have created vast chemical and electro-chemical industries which could not have approached anything like that scale without the impetus so provided. This impetus is not only directed towards the production of war materials, but also embodies the resolve on the part of every industrial nation to manufacture products of all kinds within its own boundaries in order to be independent of the domination of any external power. This movement has created in the older industrial countries a very great deal of dislocation and industrial depression which in turn has affected the whole world. Generations to come, however, will probably date their prosperity from our difficulties. This generation is the retort in which from the devil's brew therein is being distilled a more pleasant future for the world.

NOTES AND COMMENTS

Safety Outside the Works

CONCERNED as it is mainly with road accidents, the August-September issue of *Safety News* points out that these in themselves are almost as great an evil to the industrialist as accidents in the works. A number of inquest reports have revealed that the majority of road victims "were mechanics, artisans, or tradesmen whose work, if not actually the making of munitions, was directly or indirectly connected with the war effort." It is obviously a weak point in the safety precautions observed in a works, that after exercising great care there, an employee can be killed or injured through carelessness while travelling to or from his work, or for that matter, while he is moving in his own time. In these days especially every life is precious to the nation and no effort should be spared to impress upon all workers that "safety first" does not end in the works. On other branches of the same subject, the journal publishes a report of an address presented before the Sheffield Industrial Committee, on the employment of women in industry. The speaker was Miss A. G. Shaw, of Metropolitan Vickers, Ltd., Manchester. She is of the opinion that except for the wearing of caps by machine operators, no provisions affecting women only need be taken. It is, however, of first-rate importance where women are employed to appoint a woman personnel officer.

Luminescence and its Proper Use

LUMINESCENT materials and their war-time uses are dealt with simply but extensively in Technical Bulletin C17 of the Ministry of Home Security. The main purpose of the bulletin is to place information about luminescent materials on a sound footing among the lay public, as at the outset of the war many such materials were provided and sold for purposes to which they were completely unsuited. Commercial development, as often, outran technical knowledge. Definitions of phosphorescence and fluorescence, familiar to readers of THE CHEMICAL AGE, are outlined and a list of the materials available, with their properties, is added. No attempt is made to gloze over the difficulties attached to the use of certain products, *e.g.*, the tendency for organic fluorescent materials to be washed out of the surface layer of a paint film on weathering. Due prominence is given to the zinc, zinc-cadmium, and alkaline earth sulphides. A later section is devoted to irradiation sources, with their advantages and drawbacks. For instance, whereas the argon glow lamp is a convenient and economical source of irradiation, its brief life (as at present manufactured) is an obvious disadvantage; tungsten-filament lamps, on the other hand, last longer, but consume much more electrical power to achieve the same effect. Possible applications of luminescent substances are next dealt with, and those most likely to interest the chemical industries in general are the marking of switches and instruments in rooms that are difficult to obscure, and the provision of emergency signs in factories, in case of the failure of the lighting supply during a hurried evacuation of staff. Either fluorescent or phosphorescent materials would appear useful for the former function; for the latter, zinc sulphide used with paint or vitreous enamel, to give a bright glow for a short period, would be satisfactory.

Exports must be Maintained

A LETTER from Sir F. D'Arcy Cooper, Chairman of the Business Members of the Industrial and Export Council, Board of Trade, has been addressed to chairmen of Export Groups. It points out that United Kingdom export policy has, during recent weeks, been widely attacked in the United States on the ground that British manufacturers for export are using Lease-Lend materials, or taking advantage of the arrival of Lease-Lend materials, to export to the U.S.A. itself or to South American markets, and are offering lower prices or earlier deliveries than their United States competitors. There has been much misrepresentation, some of it doubtless deliberate, and such misrepresentation will naturally have been resented by exporters in this country. The fact is that a change in the situation has taken place. So long as we were required by the United States to pay cash for whatever supplies we needed from the U.S.A., it was vitally important to us to earn as many dollars as possible, and we had to be prepared to stint the civil population if necessary in order to do so, and we urged our traders to make every effort to sell in dollar markets and in those South American markets from which we were drawing essential supplies. For this reason there will doubtless have continued to arrive in the U.S.A., in the days of Lease-Lend, goods of which delivery was planned beforehand. Our Government has, therefore, offered to the United States Government the undertaking which is contained in the White Paper laid on the table of the House of Commons on September 10. This undertaking adds further to the many difficulties under which the export trade already labours, but it is wrong to jump to the conclusion that the United Kingdom need no longer trouble about its export trade. Exports, properly directed and so controlled as not to allow the use of Lease-Lend materials to facilitate competition with the United States, remain essential to the war effort.

Rotproofing Sandbags

THE dismal spectacle of tier upon tier of dilapidated sandbags is nowadays, happily, not quite so common as it was in the earlier months of the war. Haphazard laying of unproofed, badly-filled sandbags was soon found to be completely ineffective as a defence measure against any form of attack, whether meteorogical or intentionally hostile, and accordingly the Sandbag Advisory Committee was formed by the Ministry of Home Security to study the subject of proofing sandbags. Of this committee, with its faintly equivocal title, Dr. E. F. Armstrong, F.R.S., eventually became chairman, and, as might be expected in those circumstances, things soon happened, and useful things at that. Last week's issue of *Chemistry and Industry* contains Dr. Armstrong's statement, based on the work of the above-mentioned committee, which deals straightforwardly with the two main heads of the principal subject: the characteristic necessary for an ideal rot-proofing material, and the causes of the deterioration of sandbags. This is not the place to recapitulate the work of the committee, but, in brief, the various suitable proofing media for treating clean bags in quantity were: tar distillates, organic copper salts, and cuprammonium. Creosote of the correct specification (*see* BS/ARP 57) was effective in amounts ranging from 20 to 25 per cent. by weight of the fibre, but most effective of all was a copper naphthenate/creosote mixture with 0.5 per cent. copper content. Bags thus proofed are expected to have a duration of life of at least two years. When it is observed that the life of an untreated sandbag varies from 21 days to a maximum of 82 days in exceptionally cold weather the advantages of rotproofing stand out all the more clearly.

Wholesale Prices in August

WHOLESALE prices, as measured by the Board of Trade index number, showed no change in August compared with July, this being the first month since the outbreak of war for which there has not been some rise in prices. The food index fell by 0.3 per cent., while that for industrial materials and manufactures rose by 0.2 per cent., or from 156.5 to 156.8 (1930 = 100). For chemicals and oils the figure was 127.9 (against 127.5); for iron and steel 181.2 (181.3); and for non-ferrous metals 123.7 (123.8). These figures represent an increase of 0.3 per cent. in chemical prices over those for July, 1941, and of 7.2 per cent. over August, 1940. Both ferrous and non-ferrous metals show a fall of 0.1 per cent. compared with last month, and the non-ferrous metals group shares with the meat, fish, and eggs group the distinction of showing the lowest rise in price since August, 1940, amounting to only 0.1 per cent. Within the groups commodity percentage changes were very small, the only change of more than ½ per cent. that falls to be recorded being a drop of 1½ per cent. in the average import value of iron ore.

Recovery of Used Lubricating Oil, I

Two Groups of Reclamation Methods

by J. E. WALKER

THE question of the recovery of used lubricating oil has been discussed and argued in this country for many years, the crux being whether or not the recovered oil could be regarded as a satisfactory lubricant. Actually, there can be no real argument on this point, as from chemical and technical viewpoints used-oil reclamation is quite simple, and provided that the process of recovery is properly carried out, the recovered product should prove quite serviceable. If the best methods of recovery are used, the resulting oils should at least be equal to the original lubricant, and in special cases will be better. Probably the chief difficulties to be overcome are the collection and grading of the used oil and the subsequent marketing of the finished products in the face of a certain amount of prejudice, which fortunately is declining.

Perhaps for obvious reasons, the recovery of used oil has not been popular in this country with the trade; and few outside the trade have the necessary knowledge and experience to effect complete recovery and produce really reliable products. Whatever the reason, little has been done; yet in America, the real home of the oil industry, and the producer of the greatest quantity of new lubricating oil, it has been found both necessary and convenient to recognise recovery as a real commercial proposition, and the oil industry has to a certain extent financed the work.

Work of National Importance

In Germany, long before war broke out, it was a serious offence to destroy used oil, and recovery was compulsory; while in France at the present time it is reported that a motorist cannot buy new oil without surrendering his crank-case drainings for reclamation. Yet in this country, even in present circumstances, the recovery of used oil is in rather an embryonic state. Most of our lubricating oil has to be imported, and was worth some £4,000,000 last year. Thus it can be seen that fairly substantial sums of foreign exchange are required. From this point of view only, it would appear that oil recovery should be regarded as of national importance, and the work carried out thoroughly. To the author's knowledge some progress is being made, but it has been painfully slow, and there is much room for improvement. Moreover, the recovery of oil should not be regarded as a war-tme expedient only; the fact that in an emergency recovered oil has been used and found satisfactory should do much to sweep away prejudice and leave the way clear for considerable post-war development.

Before describing the actual processes of recovery, it is necessary to decide what is meant by "used oil," and what impurities present in this oil have to be removed. Lubricating oils can be broadly classified as diesel and internal combustion engine oils, machine oils, electrical oils, turbine oils, and steam engine oils. Of these, diesel engine and internal combustion engines oils, *i.e.*, motor crank-case drainings, are those usually forming the basis of oil-recovery, and will be the ones considered here. Other classes would require special recovery treatment, but a plant fully equipped to carry out complete recovery of crank-case drainings could, with some attention to details, handle the others.

Lubricating oils of varying viscosities are obtained from crude petroleum by fractional distillation, usually under vacuum, and are subsequently refined by various methods to give products free of impurities and substantially free of components which would be unstable under the conditions of service to which the finished oils will be subjected. These refined oils, therefore, consist of mixtures of relatively stable hydrocarbons; nevertheless, all oils being such mixtures, it would appear likely that some of these hydrocarbons will prove less stable than others; in even the most highly refined oils this is the case.

It is a common idea among many users of lubricating oils, that these lubricants get thinner in use owing to being squeezed and crushed in the bearings, and so losing body and oiliness. The fact remains, however, that under pressure alone, oil is practically indestructible. Unfortunately, in use, other forces are at work on the oil, and that powerful trio, pressure, heat, and oxygen (from the air), are all operating at the same time. Under such conditions even the most stable of lubricants eventually suffers from oxidation and cracking; and the poorer the quality of the oil, the more rapid and severe is the decomposition thus produced. In addition, varying amounts of foreign matter such as water, grit, dust, etc., reach the crank-case, while "burned" or distilled oil leaves a carbon residue, and unburned fuel often leaks past the piston rings, thus reaching the oil.

Formation of Impurities

Under heat and pressure the lubricating oil "cracks" slightly, *i.e.*, it is decomposed, and some of the more unstable molecules are broken down into substances of lower molecular weight, and, as in most cracking processes involving heavy hydrocarbons, there is a certain amount of excess carbon, or "coke." Thus from this process of decomposition, the oil becomes diluted with lower molecular weight bodies of kerosene and gas-oil type, while the carbon produced is dispersed throughout the oil, and eventually, with other substances, form deposits in various parts of the engine.

Oxidation leads to the formation of various polymerised bodies, resulting in a thickening of the oil. This is partially offset by dilution; hence the viscosity of a used oil cannot be used to indicate the effects of either dilution or oxidation. While polymerisation is taking place, soluble and insoluble "sludges" are formed, the insoluble portion eventually separating out; in addition, saponifiable matter and bodies of an aldehydic nature are formed, which in the presence of moisture lead to emulsions, soap, and acidic compounds. Thus in oil that has been used under quite normal conditions, the following impurities are all likely to be present: 1, sludges, soluble and insoluble in the oil; 2, saponifiable matter; 3, aldehydic bodies; 4, acidic compounds; 5, carbon, grit, dirt, metallic particles; 6, moisture; 7, dilution. The resulting oil is dark-coloured, corrosive, has an unpleasant smell and poor lubricating qualities, and forms deposits in many parts of the engine, *e.g.*, piston heads and rings, oil ducts, and valve stems. Thus it becomes inefficient and even dangerous and must be discarded. Too often it is thrown away.

The foregoing outline may have appeared somewhat lengthy, though is not by any means the complete picture, but it does give a brief idea of what happens to the oil in use and the resulting impurities therein which have to be eliminated.

Partially Recovered Products

The reclamation of used oil can be regarded from two distinct viewpoints: 1, The recovery of oil by its "users"; and 2, the recovery of oil at a central plant. Here it should be noted that those methods which from technical and economic considerations are usually adopted by "user-recovery" plants do not give saleable products, *i.e.*, they can be regarded as giving partially recovered products only. These may be quite usable again, especially as their nature will be well known to their prospective user. Conversely, the methods open to the operators of a central plant give perfectly marketable products, which can be regarded as completely recovered oils. An examination of the table overleaf showing the analytical tests of a new oil, the same oil after use, and after being recovered by various methods, will make this point clearer. There is no doubt that some of the prejudice against recovered oils is due to the marketing of partially recovered oils, and it is to be hoped that this will not recur.

Results of Comparative Tests on Used Oil Recovered by Various Methods.

Designation of Test.	New Oil.	Used Oil.	Oils Refined by Method :— 1	2	3	5	6
Specific Gravity at 15° C. ..	.886	.907	.901	.902	.895	.895	.881
Closed Flash Point (P.M.) ..	218° C.	107° C.	107° C.	118° C.	149° C.	210° C.	221° C.
Open Flash Point (P.M.) ..	230° C.	146° C.	146° C.	149° C.	171° C.	218° C.	235° C.
Viscosity (Redwood, No. 1)—							
at 20° C.	1835	2035	2100	2085	1950	2025	1810
„ 37° C.	638	655	660	658	645	650	631
„ 60° C.	215	218	220	221	219	222	217
„ 93° C.	72	64	64	67	66	74	74
„ 100°C.	63	58	58	61	60	64	65
Viscosity Index	87	60	60	72	68	88	96
Saponification No.	Nil	6.2	6.0	6.1	4.7	2.3	Nil
Total Acidity (mg. KOH per 10 g. of oil) ..	Nil	8.6	8.8	8.5	1.2	0.5	Nil
Ash	0.004%	0.74%	0.03%	0.01%	0.006%	0.008%	0.003%
Hard Asphaltum	Nil	2.12%	2.06%	2.04%	1.21%	1.18%	Nil
Coke (Ramsbottom)	0.37%	2.35%	1.45%	1.25%	1.15%	0.84%	0.29%
Setting Point (I.P.T.) ..	—15° C.	below —18° C.	below —18° C.	below —18° C.	—18° C.	—15 C.	—15° C.
Water (D & S) ..	Nil	1.8%	Nil	Nil	Nil	Nil	Nil
Insoluble in Benzene	Nil	1.38%	0.05%	0.02%	Nil	Nil	Nil
Colour	ClearRed	Black	Black	Greenish Black	Green	Green	ClearRed
Odour	Paraffinous	Burnt	Burnt	Burnt	Fair	Fair	Paraf.

The type of organisation falling into the first category includes users of lubricants on a large scale, such as haulage contractors, airway companies, Government departments, and corporations. As already stated, only partially recovered oils usually result, as for any single organisation the cost of installing plant for complete recovery is relatively high, and the technical skill necessary for its operation not easily obtainable.

User-Recovery Methods

The methods open to the user who wishes to undertake reclamation are as follows: 1, cold or hot settling, with or without filtration; 2, hot treatment with an acid salt, followed by settling and/or filtration; 3, hot clay treating followed by filtration. The simplest methods are those falling under section one, and all tend to produce a similar type of finished product. It is hardly necessary to describe the methods of settling and filtration, since they are so well known. It is sufficient to say that, given the best of treatment under these methods, the finished oil will be free of water, carbon, insoluble sludge, and all mechanical impurities, with a somewhat reduced dilution, depending on the temperature of settling. In all other particulars, it will still be a used oil.

The second method is also comparatively simple, the oil being first cold-settled, the semi-clear oil then being washed with a fairly large amount (*e.g.*, 20 per cent. by vol. of the oil to be treated) of an aqueous solution of an acid salt, one frequently used being sodium phosphate. By mechanical means the oil and solution are thoroughly mixed for a period of one to three hours, depending on the contamination of the oil being treated. This operation is usually carried out at a temperature of 105° to 110° C. in an apparatus where evaporated water can be condensed and returned to the mixture, while any light fractions, *i.e.*, the dilution, coming off, can be condensed, trapped and run off. The results obtained are similar to those obtained by methods under section one, but since the acid salt has a certain coagulating power for some of the oxidation products, and more light ends are removed, the finished oil is cleaner, has a better viscosity curve and is a little more stable on re-use. Otherwise, it must still be classed as a used oil.

The last method and the one yielding the best results for user-recovery plants is the clay treating of used oils. The apparatus required is quite simple, consisting of a covered pot fitted with an efficient mechanical agitator, and a vapour outlet fitted with a condenser. Heating can be by either gas, electricity, or steam, but must be sufficient to reach and maintain a temperature in the treating vessel of 110° to 120° C., and local overheating must be prevented. An efficient filter-press and pump complete the outfit. The oil to be treated is first thoroughly settled, and the partially clarified oil charged to the treating vessel. Clay, preferably a good quality, highly activated earth, of the type marketed for oil-refining by the Fullers' Earth Union, is added; the quantity used depends on the condition of the oil to be treated, from 3 per cent. to 10 per cent. by weight usually being sufficient. Under constant agitation, the clay/oil mixture is gradually raised to a temperature of about 110° C. and maintained around this figure for some 30 to 60 minutes. It is then filtered while hot, and the finished oil is run to storage. Oil thus processed in this manner will be free of water and all suspended impurities, will have a lower content of soluble sludges, no acidity, much reduced dilution, and greatly improved colour and odour.

It is possible, perhaps, to regard this finished product as a " half-new " oil, of inferior quality to the original stock, but quite usable. Its most serious drawback is its lack of stability, due to the presence of residual soluble impurities, which apparently act as focal points for the recommencement of decomposition.

These various methods can be varied to suit individual needs, as by temperature adjustments and the use of larger quantities of refining mediums better results can be obtained. Under such conditions, however, technical knowledge and economic considerations play an increasing part, while the best result that can be expected is a clean oil of rather inferior qualities. On the other hand, it should be borne in mind that frequently large quantities of oil containing only suspended impurities have to be reclaimed. One of the methods already described would then obviously be the most economical choice. Therefore the condition and quantity of the oil to be treated usually decides the method to be adopted, in so far as the various treatments can be used by the operators concerned.

(*To be continued.*)

Chemistry of the Chlorites

Reactions with Various Hydrocarbons

INTEREST in the chemistry of the chlorites has been stimulated by the recent commercial production of sodium chlorite. Until a few months ago the literature afforded only meagre information on this subject, however, and knowledge of their chemical behaviour with the carbohydrates was limited to the fact that sodium chlorite bleaches the objectionable coloured substances in paper and cotton textile materials without weakening the cellulose fibres. A reagent possessing the desirable properties of sodium chlorite should find extensive use in the field of carbohydrate chemistry. To provide a guide for the application of the reagent and to determine how the characteristic groups and structures occurring in the carbohydrates reacted with chlorites, Allene Jeanes and Horace S. Isbell undertook a systematic investigation of the reactions of chlorites with carbohydrate material of diverse character. (*J. Res.*, 1941, R P. 1408). Their investigation has shown that at room temperature the non-reducing disaccharide, sucrose, is completely inert to chlorites under all conditions which do not involve acid hydrolysis, and that all ketoses, the polyhydroxy alcohols, the glycosides, and the aldonic acids are attacked only after prolonged treatment with chlorites. On the other hand the aldoses are readily oxidised and give the corresponding aldonic acids. Aldopentoses are oxidised more rapidly than the aldohexoses and the monosaccharides more rapidly than the disaccharides. The reaction is slow in neutral solution, but rapid in acid solution. Quantitative measurements under various conditions have revealed that chlorous acid is the oxidant and that the reaction corresponds in large measure to the following equation:

$$(\text{Aldose}) + 3HClO_2 = (\text{Aldonic Acid}) + 2ClO_2 + HCl + H_2O.$$

The Santa Barbara mercury deposit near the town of Huancavelica, Peru, which has been idle for almost 15 years, is to be reopened, according to unofficial advices. The average mercury content of the ore is believed to be about 2 per cent.

Safe Practice in the Chemical Laboratory

II.—Treatment of Accidents and Poisoning

by JOHN CREEVEY

LABORATORY hazards of common occurrence include burns (either from hot objects or chemical agencies), scalding by hot water or steam, cuts, electrical shocks, poisoning by toxic gases or vapours, poisoning by chemicals taken internally or absorbed by the skin, and collapse or physical shock.

* * *

When burns from hot objects are slight they can be dressed with sterile gauze smeared with boric ointment, vaseline, 5 per cent. tannic acid, or preferably butesin picrate ointment. For a severe burn it is best to use gauze with butesin picrate as a first dressing, before seeking medical aid. If clothing adheres to the burned surface of the skin, no attempt shall be made to remove this until facilities are available for properly dressing the burn; as a preliminary measure cut the clothing round the burned area before applying the first dressing. If a blister has developed do not pierce or open it without instructions from someone qualified to give advice.

* * *

Burns due to corrosive chemicals need different treatments according to the nature of the corrosive. For strong acids wash the burn with large quantities of cold or merely tepid water, and then with a 5 per cent. solution of sodium bicarbonate, and finally dress with gauze and butesin picrate ointment, boric ointment or vaselin, as in the case of burns from hot objects. The same treatment may be used for bromine burns, but for phosphorus, pretreatment with a 1 per cent. solution of copper sulphate is advisable to retard further action from unburned phosphorus. Sometimes, as in the case of a severe burn from hydrofluoric acid, it is preferable to dress the burn, after washing and neutralising, by dusting on boric acid powder and applying a bandage made wet with a saturated solution of boric acid, rather than use the ointments mentioned. Burns due to strong alkalies should be washed with water and then with a 5 per cent. solution of acetic acid, after which they can be dressed as already described. Burns due to phenol should be washed with ethyl alcohol or surgical spirit, and then dressed. Burns from entry of chemicals into the eye should have immediate treatment by flushing with large quantities of cold water, followed by a 5 per cent. solution of sodium bicarbonate (if due to acids) or a 5 per cent. solution of boric acid (if due to alkalies). Formaldehyde may be treated in the same way as acids. In all cases, after washing, put one or two drops of castor oil into the eye.

* * *

The main danger from cuts is excessive bleeding; secondly, ingress of poisonous chemicals, or risk of infection by common bacterial agencies. If bleeding is not serious, the cut can be cleaned up by washing with ethyl alcohol or surgical spirit, removing any broken glass, dirt, and adhering chemicals, and then applying 1 per cent. tincture of iodine, followed by a dressing of vaseline on gauze, and final bandage, which must be secure but not too tight. Where bleeding is serious, it must be stopped. If the blood is scarlet and flows intermittently, apply a tourniquet about four inches below the armpit or four inches below the groin, according to whether the cut is on arm (or hand) or leg (or foot). If the blood is dark coloured, the tourniquet can be applied below the cut. A tourniquet should not be tightened more than is necessary to stop bleeding, and on no account should it be held tight for longer than 15 minutes at a time; if bleeding has not stopped, loosen the tourniquet for a few seconds and then re-tighten it. A piece of rubber tubing, ½ in. bore, makes a good tourniquet. If the situation of the wound does not permit application of a tourniquet, press sterile gauze firmly into the wound and apply pressure until clotting takes place.

Electrical shock is more frequent in laboratories than commonly supposed. The first thing to do is to shut off the current; if this cannot be done immediately, remove the source of contact as cautiously as can be done by aid of some insulating medium such as a dry stick. Artificial respiration must then be started immediately, details of which should be familiar to all laboratory workers who are in presence of danger from electrical shock. Meanwhile, keep the patient warm by aid of a blanket and hot water bottles, and even if there are signs of stiffening continue the work of artificial respiration for at least four hours.

* * *

For poisons taken internally a good general antidote is a mixture of 2 parts pulverised charcoal, 1 part magnesium oxide and 1 part tannic acid, using one heaped teaspoonful to a glass of warm water. The use of this antidote is especially desirable when the nature of the poison is not indicated, and a specific antidote cannot be given. To induce vomiting, a common emetic is made by stirring one teaspoonful of powdered mustard in sufficient warm water to make a creamy mixture; as an alternative, warm salt water may be used, or 0.005 gr. of potassium antimony tartrate dissolved in 25 c.c. of water. When poisoning is due to strong acids or alkalies and there is sure to be injury to internal tissues, excessive vomiting must be avoided, and should be followed by giving 3 to 5 gr. of dried egg albumin in a glass of cold water, or white of egg or milk, or medicinal liquid paraffin.

* * *

In the case of poisoning by cyanides, speed is essential in the matter of treatment. If cyanide has been swallowed, artificial respiration must be applied if the person has become unconscious. Vomiting can be induced by the common methods, and, additionally, the person should be given 250 c.c. of water containing 10 c.c. of 3 per cent. hydrogen peroxide, or 250 c.c. of water containing 12 gr. of ferrous sulphate and 12 gr. of sodium bicarbonate. The inhaling of the vapour of amyl nitrite will be beneficial to keep the patient from collapse. If cyanide vapour has been inhaled, there must be immediate removal to fresh air, with the administration of oxygen.

* * *

Detailed treatment for particular poisons, if known to have been taken, should be sought elsewhere; particular mention can be made of phosphorus and chlorine. In the case of of phosphorus, induce vomiting and give 2 gr. of copper sulphate in 100 c.c. of water; follow by large quantities of water and 5 c.c. of turpentine which has been well oxidised by exposure to the air; then give 15 gr. of magnesium sulphate in 100 c.c. of water. In phosphorus poisoning do not give white of egg or milk. For chlorine, give 2 c.c. of ammonium hydroxide in 100 c.c. of water, induce vomiting, and then give milk or white of egg; follow by 4 gr. of sodium thiosulphate in 400 c.c. of water.

* * *

Collapse, or physical shock, will vary with the individual, and may be serious. The main symptoms are paleness, moist skin, and persistent trembling. First place the patient in a reclining position, with the head lower than the body (except in cases of serious bleeding); cover with blankets and keep warm with hot water bottles. Then rub the extremities briskly towards the heart to restore circulation. Give stimulants by mouth (if conscious), or by inhalation (if unconscious). A teaspoonful of aromatic spirit of ammonia in half a glass of warm water is one of the best stimulants; to be inhaled, apply on a gauze. If there is bleeding, the promotion of circulation should be postponed until the bleeding has been controlled.

LETTER TO THE EDITOR

Rules for Laboratory Design

SIR,—The article, "Safe Practice in the Chemical Laboratory" in your issue of August 16 must be of interest to those who have to plan a laboratory.

Although the general principles are, of course, excellent, I cannot agree with some of the details: for instance, the statement that it is safer to put a bottle on a tray rather than on a reagent shelf in the centre of a laden work bench does not conform with commonsense, nor to the opinion of the very large number of chemical workers with whom I have had, and still have, the pleasure of designing and equipping laboratories. It must be more dangerous and laborious to reach "across and down" rather than only "across."

In the very many laboratories that I have visited during the last twenty years, I have never seen a satisfactory fume cupboard with doors that slide horizontally. These may be satisfactory in operation when new, but time shows their failings. A horizontal door which sticks is more dangerous than a vertical sliding door which runs smoothly. Again, "easy running steel chains" sounds excellent, but how long would they remain "easy running" in a laboratory dealing with steel or aluminium analysis.

Through hard experience I have learned that it is dangerous to give general advice on laboratory design without first having full details of the work which is to be done in the laboratory, the title "Chemical Laboratory" being much too vague a description. The following rule, however, should be obeyed wherever possible:—

Efficiency and safety should be inseparable in a laboratory, but safety should follow efficiency; therefore, design efficiently. The first principle of efficient laboratory designing is to plan your building to house your laboratory, and not your laboratory to fit your building. This particularly applies to fume cupboards and wastes as walls and floors must be carefully designed if the maximum efficiency of modern design is to be obtained.—Yours faithfully,

C. L. PRIOR,
Director.
Baird & Tatlock (London), Ltd.

London, E.C.1.
September 16, 1941.

Magnesium from Magnesite

New Development of the Hansgirg Process

A NEW plant of the Permanente Corporation, for the production of magnesium metal from magnesite by the Hansgirg process, was due to start operations on August 15, at Palo Alto, California, according to a report in the *News Edition* of the American Chemical Society. Considering that rumours have been afloat on several occasions concerning the difficulties alleged to accompany this process, the new plant will be watched with considerable interest, especially as information about similar plant in belligerent countries, such as Britain, Germany, and Japan, is impossible to obtain under present conditions. Although the process is not a new one, having been operated for some years at Radenthein, in Austria, by the Austro-American Magnesite Co., the new Californian plant has adopted certain modifications and a short examination of the main principles of the progress, with a comparison of old and new plants, is of interest

The basic idea of the Hansgirg process is to reduce magnesium oxide with carbon at a high temperature, dilute and cool the reaction products with a cold inert gas, and thus recover metallic magnesium. The reversible reaction ($MgO + C \rightleftharpoons Mg + CO$) is forced to the right by the high temperature (2000° C.) of a three-phase electric arc furnace. If the reaction products are cooled normally, the reverse reaction occurs and the yield of metallic magnesium is negligible. Sudden chilling and dilution of the Mg-CO mixture minimises the reaction between the two and gives a high yield of metal. The original process employed cold hydrogen introduced directly into the gas stream from the furnace to dilute and cool the mixture suddenly to 150° to 200° C. Approximately 50 vol. of hydrogen were used per vol. of magnesium vapour. Under these conditions metallic magnesium is precipitated as a dust containing some magnesium oxide and some carbon carried over from the furnace. The dust is briquetted with oil, distilled at 750° to 950° C. *in vacuo* and the metal condensed and collected as powder under a hydrocarbon oil. The metallic powder is then melted and cast into ingots. The residue from the still ($MgO + C$) is returned to the process. The mixture of hydrogen and carbon monoxide from the condensers is treated with steam in the presence of a catalyst to convert CO to CO_2, which is scrubbed out, and the hydrogen is returned to the process. The magnesite used should be of the highest purity consistent with reasonable cost. The hydrogen must be low in carbon monoxide content and free from carbon dioxide and water vapour. The quantity of hydrogen in circulation in the process is large, but the amount required once the process is started is merely the make-up of mechanical losses (about 4 cu. ft. per lb. of metal).

At Radenthein, the electric furnaces used were 800 kV ampère capacity, 3-phase electric furnaces. The Palo Alto plant, however, is designed on a larger scale. The first unit is a 9000 kV ampère furnace. As planned ultimate capacity will be 15,000 tons of magnesium per year. Condensation of the evolved magnesium vapour is to be effected by the use of large volumes of natural gas instead of hydrogen. Since the magnesium plant is situated close to a cement mill, the natural gas used for condensing will be passed, after removal of magnesium and dust, to the cement kilns for use as fuel.

Data from reliable sources on the operation of the process at Radenthein give a power consumption of approximately 22,000 kWh per ton of metal, a recovery of approximately 80 per cent. of the magnesium fed as ore in the form of ingots of high purity, and a consumption of hydrogen of about 4 cu. ft. per lb. of metal produced. On this basis the cost of magnesium by this method should be low.

The difficulties stated to have been encountered at other plants operating the Hansgirg process are those that might have been expected in handling hydrogen and so highly inflammable a material as magnesium in vapour and powder form. They are, however, no more insurmountable than many others successfully solved in other electric furnace industries (phosphorus and calcium carbide, for example). The vacuum distillation of the magnesium powder has presented problems in heat transfer to which a number of different solutions have been proposed.

PAPER MAKERS' DIRECTORY

A new edition of the Directory of Paper Makers has just been published by Marchant, Singer & Co., 326 High Holborn, London, W.C.1, price 6s. 6d., post free (abroad 6s. 10d.). We did not see last year's issue, but compared with the 1939 edition the price has increased by only one shilling, while the contents is fully as comprehensive despite supply difficulties. This work of reference is of the highest value to industrial chemists, who are doubly linked with the paper trade as both suppliers and consumers. The directory provides not only a record of actual and potential buyers of chemical products, but also a list of suppliers of filter-papers and other such material of importance to the chemical industry.

The kaolin deposits at Lac Rémi (Que.), between Montreal and Ottawa, are to be developed by a company known as Canadian China Clay, Ltd., with a capital of $250,000. It is estimated that a product selling at $12.20 per ton can be produced, as against $18-19 for the Cornish material. The kaolin mined is intended mainly for the paper industry, but some may be used for pottery.

Co-operation in the Colour Industries

Speech by the Chairman of the Colour Users' Association

THE value of co-operation within an industry, which THE CHEMICAL AGE has often stressed, notably in the leading article of last week's issue, was strikingly brought out in the speech delivered by Mr. N. G. McCulloch, chairman of the Colour Users' Association, at the annual meeting of the Association at Manchester on September 12. It was by a co-operative effort between the makers and the users of colour, he pointed out, that it has proved possible to manufacture, or in some instances to prepare for the manufacture of, materials that hitherto have had to be imported. It was by this combined effort that it was possible to get together the necessary machinery on the one hand, and, on the other, to obtain permission to use the raw materials and intermediates for which there is an insatiable demand for munition purposes. Of the colours put forward, some 25 per cent. have been put on the market already. In addition, a number of new dyestuffs have been produced which have shown technical advantages over any product previously available.

The problem of anthracene supply had not proved as easy of solution as appeared last year. There was need for close technical collaboration and exchange of information. It did not seem as if it would be possible to carry out the necessary distillation and concentration of the residues from which anthracene is obtained, at a price which the colour makers were able to pay. In this country there is no single large centre where coal is converted into gaseous products and coal tar, and the transport of the raw material from widely scattered districts created a problem of some complexity. It became necessary to set up a kind of clearing centre in which the problems affecting the diverse interests could be dealt with, and eventually the Mines Department set up a Coal Tar Control, appointing Major T. Knowles to take charge. Under his supervision the tar distillers freely exchanged technical information and encouraged newcomers with valuable help, with the result that there has been a steady increase in the production of anthracene, and by the end of this year there will be a production equal to 2½ to 3 times that of the output before the war. Plans for further plant have been completed, and although some time must elapse before the machinery is available, it would appear that, when the plant has been erected, the supply of anthracene in this country will be nearly four times what it was prior to September, 1939. Under the control of Major Knowles there is every possibility that the Intermediate Industry in this country will be set soundly on its feet, and we shall have cause for satisfaction in knowing that another important section of the chemical industry will have been established in our own country.

It was due largely to the representations made to the Controller of Dyestuffs by the Council of the Colour Users' Association that the prices of imported dyestuffs, as well as existing stocks of them, were very carefully controlled and maintained at a reasonable level, thus avoiding the inflated prices reached in the last war. The Council collaborated with the makers in the production of necessary raw materials for our trade, and by their activities they assisted in bringing in necessary supplies from neutral countries.

The Chairman stated that it was of the utmost importance that the good relationship, which he had already referred to, between the Colour Users' Association and the British Dyestuffs Makers should be maintained. Nevertheless, when world competition again asserted itself, it would be no less important to lay stress in the right quarter on the necessity of being able to maintain a competitive position in foreign markets. Nothing would give the colour users of this country greater satisfaction than being able to fill their requirements from the materials produced by British makers and British chemists. They would be faced with an unpleasant situation. Every tie of sentiment, and indeed of interest, would urge them to give the utmost possible help to the colour makers in this country, and so avoid being thrown back into the hands of the German makers. On the other hand, they could not allow themselves to let British industries suffer because of competition from countries which had access to materials not made here. The research organisations maintained on the Continent had been so large that it is inevitable that they must produce a percentage of specialities not made elsewhere. On the other hand, there was evidence that Germany, under the Hitler régime, was suffering severely on the academic side of research. The follies of the present régime there offered to this country a great opportunity to forge ahead; the ability of the manufacturers to take advantage of it would be influenced very greatly by the Government departments concerned.

Chemical Matters in Parliament

Fuel Economy Campaign

IN the House of Commons last week Mr. T. Smith asked the Secretary for Mines what measures he proposed to draw attention to the need for economy in the use of fuels this winter and to ensure that the supplies available were used with the greatest possible efficiency.

In a written reply Mr. Grenfell stated that, as forecast in earlier statements, the Government had during the past month instituted a comprehensive campaign for the greatest possible economy in fuel consumption, covering not only coal and coke, but gas, electricity, fuel oil and paraffin as well, and extending both to industrial and non-industrial use. On the industrial side an expert committee had been appointed to advise on the many technical aspects of fuel economy. On the non-industrial side representatives of all the supplying interests were collaborating with the Government departments concerned in propaganda on a wide front for the same purposes.

Constitution of the Committee

The industrial committee, it is reported, is constituted as follows:—

Mr. E. S. Grumell, D.Sc. (chairman), head of the fuel economy department of Imperial Chemical Industries; Mr. J. G. Bennett, director of the British Coal Utilisation Research Association; Mr. W. L. Boon, general manager of the London and Counties Coke Association; Mr. W. J. Drummond, member of the Central Committee of the Mining Association and managing director of the Ashington Coal Company, Limited; Mr. E. V. Evans, general manager of the South Metropolitan Gas Company and chairman of the Gas Research Board; Sir Clement Hindley, past-president, Inst.C.E.; Mr. R. J. Sarjant, D.Sc., technologist of the iron and steel industry (with Hadfields, Limited); Mr. F. S. Sinnatt, D.Sc., director of fuel research of the Department of Scientific and Industrial Research; Mr. Johnstone Wright, chief engineer of the Central Electricity Board.

This committee, THE CHEMICAL AGE understands, will work in conjunction with a staff of combustion engineers who have been placed at the disposal of the Mines Department by the Coal Utilisation Joint Council. In addition, the advice of the coal survey officers of the Department of Scientific and Industrial Research is being made available.

Calcium and Vitamin B in Flour

Sir E. Graham-Little asked the Parliamentary Secretary to the Ministry of Food whether the proposal to add calcium to the fortified loaf had been abandoned in view of his announcement that the white loaf now issued did not contain that addition; and when the addition of synthetic vitamin B 1 would be made. Major Lloyd George replied that the proposal to add calcium to white flour had not been abandoned. The fortification of white flour with vitamin B 1 had already begun in certain mills supplying the South Wales area, and would shortly be extended.

Personal Notes

MR. JOHN GRAYMORE, M.Sc., Ph.D., A.I.C., formerly at the Stockport College for Further Education, has been appointed head of the chemistry and applied chemistry departments of the Royal Technical College, Salford.

DR. J. W. JENKIN, Director of Research, Tube Investments, Limited, has been appointed adviser on steel tubes to the Ministry of Supply. His services will be available to other Government departments.

MR. GEORGE KING, M.Sc., F.I.C., has been re-elected chairman of the Midland Chemists' Committee for the session 1941-42, and MR. W. T. COLLIS, F.I.C., is hon. treasurer. MR. E. M. JOINER, B.Sc., A.I.C. (Halton Road, Sutton Coldfield) has been appointed hon. secretary.

MR. NORMAN N. HOLDEN, of Hardman and Holden, Ltd., Manchester, has been appointed chairman of the National Sulphuric Acid Association, in succession to MR. R. G. PERRY, C.B.E., J.P., who had occupied the position since the foundation of the Association in 1919.

MR. JOHN HAND, until recently technical director of Cray Valley Products, Ltd., makers of glyptal resins and drying oils, has been appointed general manager of Scott Bader and Co., Ltd., manufacturers of solvents, plasticisers, etc.

DR. KARL A. FOLKERS, assistant director of research to Merck & Co., Inc., has been awarded the American Chemical Society Award in Pure Chemistry for "contributions in the field of organic chemistry, including *Erythrina* alkaloids, vitamin B_6, catalytic hydrogenations, and pyrimidines."

CAPTAIN PHILIP K. POTTER, R.A., who is now fulfilling duties in connection with munition production under the Ministry of Supply, and who is connected with the chemical manufacturing firm of E. P. Potter & Co., Ltd., Bolton, Lancs., was married at Broughton last week to Miss Sheila Partington.

DR. J. G. KING, of the Fuel Research Station, and MR. A. T. GREEN, of the British Refractories Research Association, are members of the committee appointed by the Minister of Works to advise him on the steps to be taken for increased efficiency and economy in the manufacture of bricks.

Obituary

PROFESSOR PAUL SABATIER, whose death at Toulouse on August 14 is reported, was one of the most famous European chemists of the century. He was in his 87th year and had been Professor of Chemistry at Toulouse University since 1882, having previously held appointments at Nimes and Bordeaux. In 1899 he discovered, with Senderens, the process for the catalytic hydrogenation of oils, and his later work on organic chemistry was especially devoted to the study of catalytic activity, notably that of finely-divided metals. He was awarded the Nobel Prize for Chemistry in 1912, the Davy Medal of the Royal Society in 1915, and the Franklin Medal of the Franklin Institute in 1933.

PROFESSOR ARTHUR GEORGE GREEN, F.R.S., M.Sc., F.I.C., F.C.S., who died at Walton-on-Thames on September 12, at the age of 77, was formerly director of research, British Dyestuffs Corporation, and Professor of Chemistry (Dyestuffs) at the University of Leeds. Professor Green, who was educated at Lancing and at University College, London, was, on leaving College, employed in the work of Messrs. Brooke, Simpson and Spiller, aniline colour manufacturers, as a research and manufacturing chemist. Later, from 1894-1901, he was employed as chief chemist and manager of the colour works of the Clayton Aniline Co. The professor, who was the inventor of a number of new coal-tar colouring matters, and also, in conjunction with Mr. N. F. Oxley, the inventor of a simplified method of making mustard gas, was a Perkin Gold Medallist and Research Medallist of the Dyers' Company, and in the course of his career held advisory appointments to dyestuff manufacturing firms in this country, the United States and on the Continent. He was a member of the Dyestuffs Development Committee of the Board of Trade, of the Industrial Solvents Committee and of the Medical Research Council, and was the author of several publications dealing with various aspects of dyestuffs research and industry. He had likewise served as a vice-president of the British Association of Chemists.

New Control Orders

Lime, Slag and Stone

THE Minister of War Transport, by the Control of Stone, Slag and Lime Order, 1941 (S.R. & O., 1941, No. 1302), has ordered that the following materials shall not be acquired, used or disposed of, except under licence, as from September 1. Conditions of price as deemed necessary may be attached to the licence, and the licences may be rescinded or varied at any time. The scheduled materials are as follows:—

Agglomerate; andesite; aplite; arkose; basalt of all kinds; brecia; chert; conglomerate; contact-altered rocks; diorite; dolerite and diabase; dolomite; elvan; epidiorite; felsite; flint; gabbro of all kinds; gneiss of all kinds; granite of all kinds; granophyre; granulite; greenstone; greywacke; grit, hornblende-rock; hornblende-schist; lamprophyre; lime (except chalk lime); limestone of all kinds; marble; mudstone; pennant; peridotite; phonolite; picrite; porphyry; porphyrite of all kinds; quartzite; rhyolite; sandstone of all kinds including flagstone; schist of all kinds; serpentine; slag (except basic slag); syenite; toadstone; trachyte; tuff; whinstone.

Export of Soap and Indigo

Extensions of the prohibitions on the export of soap of all kinds and of indigo, as well as of numerous articles of non-chemical interest, are included in the Export of Goods (Control) (No. 33) Order (S.R. & O. 1941, No. 1427), which comes into force on October 1.

Purchase Tax Amendment

Wider Scope of Registration

THE Treasury has made the Purchase Tax (Reduction of Registration Limit) Order, 1941 (S.R. & O. 1941, No. 1389) which, subject to the approval of the House of Commons, comes into operation on November 3, 1941. This provides for the reduction of the registration limit from £2000 to £500. Accordingly, manufacturers of chargeable goods and persons carrying on a wholesale business in chargeable goods who have hitherto been exempt from registration will now be required to apply for registration, if the gross proceeds of their sales of chargeable goods exceed on the average £300 a year. In deciding whether this limit is exceeded, manufacturing retailers should exclude any retail sales of goods not of their own manufacture. Where a person carries on two or more businesses (whether in the same or different names), liability to registration depends on the aggregate proceeds of the various businesses.

Manufacturers and others concerned are advised to apply for registration as early as possible, and also to include in any future quotations for the supply of chargeable goods an addition in respect of the tax for which they may be accountable on and after November 3, 1941. A list of the goods chargeable with Purchase Tax is contained in Notice No. 78 (recently reprinted and brought up to date) issued by the Commissioners of Customs and Excise, which together with the prescribed form of application may be obtained from any Officer of Customs and Excise.

Carbon tetrachloride produced in the U.S.A. in 1940 amounted to over 100,000,000 lb., according to a preliminary survey of the Tariff Commission. The production in 1939 was nearly 85,000,000 lb.

General News

Proposals by a committee to amend the staffing of the Burnley borough analyst's department met with objections at a recent meeting of the town council and were referred back for further consideration.

The Ministry of Labour is evidently finding out the good qualities possessed by china clay workers, as already numbers of them have been released from their former employment in the clay works to act as works patrol men in great aircraft works far removed from St. Austell.

Under the scheme for the distribution of liquid milk, which comes into force on October 1, provision will be made for the supply of milk for consumption as a beverage by industrial workers. Undertakings concerned should apply to the local food office for an application form, on which they must nominate their milk supplier.

Boric talc dusting powders of the following composition: boric acid 100 g., oil of geranium 2 ml., purified talc to 1000 g., with or without 100 g. of powdered starch, may be supplied in bulk to hospitals and similar institutions, but not for re-sale, by persons registered in Class 16, over and above their quota. A doctor's certificate that the supplies are needed for the institutions is required.

A lecture on "Potentiometric Redox Titrations and the Use of Redox Indicators" was delivered at Bristol University Chemical Department by Professor H. T. S. Britton, D.Sc., F.I.C., on Thursday last week. The meeting was arranged by the Bristol and South-Western Emergency Joint Committee, representing the Chemical Society, the Institute of Chemistry, and the Society of Chemical Industry.

The Board of Trade has decided, with the approval of the Treasury, that the war damage premium payable under the Business Scheme for the whole year to September 30, 1942, shall not exceed 30s. per cent. For the six months to March 31, 1942, the rate of premium will be 15s. per cent., payable, at the option of the insured, either in one sum or in two instalments at 7s. 6d. per cent. each. The rate of premium for the subsequent six months will be determined in March next and will not exceed the limit indicated.

Further decentralisation in the Ministry of Supply organisation is being attained by the extension of the duties of Regional Officers. These are now to be known as "Controllers," and will be under a Director-General, Mr. Spencer Summers, M.P. In addition to their original duties of assisting manufacturers to maintain production schedules, the Regional Controllers will now take a measure of responsibility for manufacturing efficiency in their area, and also for the proper utilisation of local labour resources.

The beneficent uses of gases formed the subject of an address by Dr. Newton Friend, chief of the chemistry department of Birmingham Central Technical College, to the Birmingham Rotary Club on Monday. Speaking of the so-called "war gases," Dr. Friend cited the use of chlorine in bleaching powder, of phosgene as an intermediate in dyestuffs manufacture, and the experimental use of mustard gas in cancer treatment. He also recalled the fact that the Spartans employed clouds of sulphurous vapour as an offensive weapon in the 5th or 6th century B.C.

The Trading with the Enemy (Specified Persons) (Amendment) (No. 15) Order, 1941, coming into force on September 11, contains over 300 additions to the list of traders in neutral countries with whom it is unlawful to have dealings of any kind. Additions of chemical interest include: Quimica "Lissa," S.A., Linea 552, Vedado, Havana, Cuba; Soc. Haïtienne de Produits Pharmaceutiques and Pharmacie Buch, both at Port-au-Prince, Hayti; Farmacia Nacional Lnis Kaufmann, Apartado 14, Tapachula, Mexico; Farmamex Productos Farmaceuticos, S.A., Isabel la Catolica 15, Apartado 1257, Mexico City; Sociedade Metalurgica Portuguesa (Buccellato & Miguel), Lourenço Marques; and Drogueria Nacional (Valentiner & Cia), Apartado 423, Caracas, Venezuela. Among the 18 deletions appears Hormopharma Argentina, S.A., San Martin 492, Buenos Aires.

From Week to Week

Preparations for the examination for associate-membership of the Institution of Chemical Engineers are now being made, and application forms for the 1942 test, together with the memorandum on "The Training of a Chemical Engineer" may now be obtained from the Hon. Registrar of the Institution, at 56 Victoria Street, London, S.W.1. In view of the ever-growing importance of the chemical engineering profession, a very large entry is expected on this occasion.

Foreign News

With the aim of increasing the bauxite output of the Japanese mandated island of Palau, a company called the Aluminium Co. of the South Seas has been formed in Tokyo, with a capital of 10 million yen, says Reuter.

Primary and secondary butanol, butyl acetate, and ethyl acetate have been added to the list of chemicals subject to export control from the U.S.A. according to Schedule No. 14 issued last month. In the same schedule export control of copper, brass, bronze, and zinc was revised.

Shellac was imported into the United States at a somewhat higher unit value during the current year than last year; imports of unbleached shellac amounted to 13,417,500 lb., valued at $1,656,100, during the first five months of 1941, compared with 14,284,800 lb., valued at $1,551,500, during the same period of 1940.

Mercury production at American mines in June last established a record monthly rate at least since the last war, and probably since the period of the country's greatest output, from 1875 to 1883, according to the Bureau of Mines, United States Department of the Interior. Output aggregated approximately 4000 flasks, compared with 3600 in May. New rich strikes contributed to production in June and, as a consequence, the sharp advance in the total may be of a temporary nature unless influenced by other factors. The monthly peace-time average is not more than 1500 flasks. Consumption dropped somewhat, amounting to 3300 flasks, a decrease of 200 flasks from the quantity reported for May.

Forthcoming Events

The London Section of the **Oil & Colour Chemists' Association** is holding a lunch-time social, beginning at 1 p.m., on **September 20,** at Oddenino's Restaurant, Regent Street, London, W.

A conference on X-Rays in industry will be held by the **Institute of Physics** at the Royal Institution, London, W.1, at 2 p.m., on **September 24.** Sir William Bragg, F.R.S., will open the conference and Professor J. A. Crowther will preside.

The first meeting in the new session of the **British Society for International Bibliography** will be held on **September 26,** at 2 p.m., at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2, and will take the form of a joint discussion on the subjects of the preparation of subject indexes to volumes of periodicals and the listing of titles of periodical publications. Dr. S. C. Bradford will open the discussion on indexing and Mr. E. Lancaster-Jones that on listing titles.

A three-day scientific conference, organised by the **British Association** (Division for Social and International Relations of Science) will be held at the Royal Institution, Albemarle Street, London, on **September 26, 27 and 28,** to "demonstrate the common purpose of men of science in ensuring a post-war order in which the maximum benefits of science will be secured for all people." Sessions will be presided over by the American, Soviet, and Chinese Ambassadors, by the President of Czechoslovakia, by Mr. H. G. Wells, and by Sir Richard Gregory, President of the British Association; and at the end Sir Richard Gregory will put forward a new charter of scientific fellowship. Poland, Norway, Holland, Belgium and France will likewise be represented, and exiled scientists from Germany, Austria and possibly Italy, will also take part.

Company News

The directors of the **Yorkshire Dyeware and Chemical Co., Ltd.**, recommend a final dividend of 7½ per cent., making 10 per cent. for the year to March 31 (12½ per cent.).

Cooper, McDougall and Robertson, Ltd., announce that no interim dividend will be paid on the ordinary shares for the year ending September 30; the half-yearly dividend on the 7 per cent. preference shares will be paid on that date.

Lever Brothers and Unilever, Ltd., have declared a dividend of 5 per cent. on the ordinary capital, for the year ended December 30 last (10 per cent.), and announce a net profit for the year, after taxation, of £6,987,130 (£6,742,053).

The directors of the **Staveley Coal and Iron Co., Ltd.**, announce a net profit for the year ended June 30 of £294,429 (£417,518). As already announced in these columns the final ordinary dividend is reduced from 5½ per cent. to 4 per cent., tax free, making a total of 6½ per cent. (8 per cent.).

New Companies Registered

East Parade (Distributors), Ltd. (369,321).—Private company. Capital, £100 in 100 shares of £1 each. Manufacturers of and dealers in chemicals, pigments, varnishes, etc. Subscribers: F. E. Holroyd; W. W. Powell. Registered office: 5 Park Square, Leeds.

Duva, Ltd. (369,216).—Private company. Capital, £500 in 400 ordinary shares of £1 each and 2000 deferred shares of 1s. each. Manufacturers of and dealers in plasters, metal, paint, varnish, chemicals, fertilisers, etc. Subscribers: J. W. Niven; G. W. A. Gray, "Dcepdene," Highwold, Chipstead, Surrey.

Chemical and Allied Stocks and Shares

FOLLOWING last week's strong advance in security values, Stock Exchange markets have developed a reactionary tendency in the absence of further improvement in the volume of business. Selling pressure was not heavy, and, in fact, many stocks and shares were reported to continue to be in short supply in the market. It is, of course, this shortage of supply which tends to result in prices being advanced sharply on moderate improvement in demand. Moreover, the firmness with which securities are held indicates confidence in the future, and willingness to be prepared to take the long view, which naturally has an important influence on sentiment. Although best prices recorded recently have not been fully held, numerous shares of companies identified with the chemical and kindred industries were better on balance.

Compared with a week ago, Imperial Chemical have improved from 31s. 9d. to 32s. 3d. at the time of writing, and the 7 per cent. preference have remained firm at around 33s. B. Laporte continued firmly held, and maintained their recent rise to 62s. 6d., while Fison Packard were 33s. 9d., and British Oil and Cake Mills preferred ordinary 40s. xd. Lever and Unilever lost part of an earlier rise, but were 26s. 3d. compared with 25s. 9d. a week ago; the increased profits for the past year created an excellent impression, while the halving of the dividend to 5 per cent. was attributed to a precautionary measure owing to the dividend equalisation agreement with the Dutch Lever N.V. and the impossibility of ascertaining results of this company in view of the German occupation of Holland. The Triplex Glass results were also up to general expectations, and the shares were higher on balance at 25s. 9d., on the improved dividend. It is apparent the company has been successful in adapting its activities to work of national importance. Nairn and Greenwich were a firm feature and held their recent rise to 61s. 3d., while there was again a fair amount of activity in Barry and Staines ordinary shares, which further improved from 36s. to 36s. 9d. On the other hand, there was an easier tendency in British Plaster Board at 17s. 3d. Associated Cement were higher at 57s. 6d. on the assumption that cement manufacturers are likely to remain actively employed, and that there may be a possibility of a better dividend than the 10 per cent. paid for the previous year. It is, however, still generally assumed that all question of an increase will be left until the final payment and that the impending interim dividend is likely to be unchanged at 5 per cent. British Oxygen at 67s. were the same as a week ago, but elsewhere, British Aluminium reacted from 47s. to 46s. In other directions, Borax Consolidated have been steady at 29s., while Amalgamated Metal shares were better at 18s. 6d., and, awaiting the financial results, Imperial Smelting ordinary were slightly higher at 13s. 3d. At 27s. United Molasses were well maintained on balance, while a rise from 68s. 6d. to 70s. was recorded in the units of the Distillers Co. Among smaller-priced issues, there was again a fair amount of activity around 3s. in British Industrial Plastics, British Tar Products transferred at close on 6s., and British Lead Mills 2s. shares changed hands at 1s. 7½d. Murex had a firm appearance at 68s. 9d. as had Turner and Newall at 71s. 10½d., while Dunlop Rubber were little changed at 35s. 9d. In the iron and steel section, movements were relatively small; Stewarts and Lloyds were 48s.; Tube Investments 94s.; Dorman Long 22s. 9d.; and Guest Keen 23s. 9d. United Glass Bottle made the higher price of 55s., and Forster's Glass 10s. ordinary shares again transferred over 18s. Awaiting the interim dividend announcement, Pinchin Johnson were higher at 24s. 3d., while International Paint moved up from 88s. 9d. to 91s. 3d. On the other hand, Boots Drug had an easier appearance at 34s. 3d., but elsewhere Beechams Pills deferred shares were higher at 10s., as were Sangers at 17s., and Timothy Whites at 21s. 6d. British Drug Houses were again quoted at 22s. 6d. Anglo-Iranian and most other oil shares lost part of the improvement recorded a week ago.

British Chemical Prices

Market Reports

A FIRM tone characterises most departments of the general chemicals market and fresh business has been more or less limited to quantities to cover immediate requirements. In regard to existing contract commitments delivery specifications cover good volumes. A good demand is noted for both grades of potassium permanganate and the demand for other potash products exceeds available supplies. Most of the soda products continue firm and there is no change of importance to record. Elsewhere barium chloride is unchanged with a scarcity of offers for early delivery and oxalic, tartaric and citric acids remain in short supply. In the coal tar products section activity continues to be influenced by the supply position, and as a result the volume of transactions during the week has been small. With the exception of pitch and pyridine most items are firm.

MANCHESTER.—Trade in heavy chemicals on the Manchester market during the past week has been on a fair scale and sellers report little interference, particularly with regard to contract deliveries, as a result of holidays in the consuming districts. These are now pretty well at an end, and so far as this factor is concerned chemical market conditions are now more or less normal. In the aggregate the past week's contract deliveries of textile and other chemicals have been on steady lines, with a moderate flow of new bookings reported. In the tar products market firm price conditions are a feature almost throughout the range, and supplies for near delivery are scarce except in pitch and one or two other materials.

GLASGOW.—There is no change in the Scottish heavy chemical trade during the past week either for home or export business. Prices are still very firm.

Price Changes

Antimony Sulphide.—Golden, 1s. 1½d. to 1s. 10d. per lb. Crimson, 2s. 1½d. to 2s. 6d. per lb.

Cadmium Sulphide.—5s. 9d. to 6s. 5d. per lb.

Carbon Black.—5¼d. to 8½d. per lb., according to packing.

Cresylic Acid.—Pale, 99/100%, 4s. 3d. per gal. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 6d. to 2s. 10d. per gal.; Heavy, 90/190°, 1s. 10½d. naked at works. MANCHESTER: 90/160°, 2s. 6d. to 2s. 10d.

Sodium Bichromate.—Crystals, cake and powder, 5 7/8d. per lb., anhydrous, 6d. per lb., net d/d U.K.

At the thirty-third Autumn Meeting of the Institute of Metals, held at the offices of the Institute, 4 Grosvenor Gardens, London, S.W.1, on September 17, the election of 38 members and student members was confirmed, and the following list of nominations was made by the Council as officers for 1942-43: as President, Lieut.-Col. Sir John Greenly, K.C.M.G., C.B.E., M.A.; as Vice-Presidents, Mr. Horace W. Clarke (Birmingham) and Mr. H. S. Tasker, B.A. (London); as Members of Council, Mr. G. Wesley Austin, O.B.E., M.Sc. (Greenock); Mr. W. F. Brazener (Birmingham); and Mr. H. W. G. Hignett (London). It was stated that the result of the election of the new officers is to be announced at the annual general meeting in March next.